

## Original Research Article

# Ethnobotanical Knowledge of *Garcinia indica* from Uttara Kannada District, Karnataka, India

### Abstract

The genus *Garcinia* comprises many species distributed in tropical regions, with *G. indica* being one of the most significant native trees found in the Western Ghats of India. This study tried to document the Ethnobotanical knowledge of *Garcinia indica* among the rural populations of Uttara Kannada district, India. The survey and interviews conducted with 120 families across different study area revealed substantial utilization of *Garcinia indica* for culinary, medicinal, and commercial purposes. The fruit rind, which contains hydroxycitric acid (HCA), serves as an ingredient in Indian cuisine and is purported to have anti-obesity effects. Its seed butter is utilized in cosmetics and medicine globally due to its therapeutic properties. There exists considerable economic potential for seed processing as a substrate in butter extraction; however, it is not scalable due to prohibitively labour intensive practices. Consequently, this study emphasizes the importance of developing an improved processing technique for these leaves, which could potentially add value and increase market price substantially. Such advancements would further generate revenue for conservation efforts, providing local communities with a sustainable source of income through the application of traditional knowledge.

**Comment [A1]:** Should not be capitalized (should be lowercase).

**Comment [A2]:** Should be "across different study areas" (plural).

### Introduction

Over 200 species of the genus *Garcinia* (Family: Clusiaceae) found in tropical parts of Asia, Africa, and Polynesia; many of these species are valuable both medicinally and commercially. Roberts (1984). *Garcinia indica* Choisy, sometimes referred to as kokum, is one of the most significant native species. It is mostly found in the Indian Western Ghats, which include Maharashtra, Goa, Karnataka, Kerala and portions of West Bengal, Assam and Gujarat (Subash Chandran, 2005). This plant has historically been collected from the wild, grown in home gardens and produced on a small scale in these areas for a variety of purposes, including as a culinary acidulant and for its medicinal properties (Krishnamurthy, 1984).

*Garcinia indica* holds a noticeable place in local cultures for its wide ranging medicinal applications. The fruit rind, seeds and butter are commonly used in traditional remedies to treat a variety of ailments, including piles, dysentery and heart conditions (Patil *et al.*, 2009). Various parts of the tree, including the root, bark and fruit extracts are engaged in treating abdominal disorders and wounds (Jena *et al.*, 2002). Kokum butter, extracted from seeds, is used in cosmetics and pharmaceuticals due to its astringent and emollient properties (Baliga *et al.*, 2011).

Ethnobotanical studies highlight the deeprooted traditional knowledge associated with different *Garcinia* species. For example, the Malamalasar tribes of Kerala use the syrup from *Garcinia gummi-gutta* to treat bilious disorders (Yesodharan and Sujana, 2007), while the fruit pulp of *Garcinia pedunculata* is employed by the Khampti tribe in Arunachal Pradesh as

a remedy for blood dysentery (Sen *et al.*, 2008). Similarly, in Assam, *Garcinia morella* is used to produce a yellow dye for silk textiles (Kar and Borthakur, 2008).

Traditional applications of *Garcinia indica* include the use of fruit rind decoctions to treat diabetes and the use of its butter as a moisturiser and wound healer (Padhye *et al.*, 2009). Species like *Garcinia dulcis* and *Garcinia mangostana* have been used in Southeast Asian traditional medicine to treat inflammatory and lymphatic ailments (Khamthong and Towatana, 2017; Assemian *et al.*, 2019). The potential for modern therapeutic uses and the cultural and medical value of *Garcinia indica*, in particular, are continually highlighted by the plants participation in traditional knowledge systems.

## Methodology

The study area falls under Central Western Ghats, Karnataka, India. The study included eight sites those are Kathgal (S1), Divage (S2), Devimane (S3), Ragihosalli (S4), Janmane (S5), Yeddalli (S6), Islur (S7) and Banavasi (S8) were chosen for the survey and a total of 120 families were surveyed (15 households per location) to record traditional knowledge and marketing information related to *Garcinia indica* in Uttara Kannada district. The data collection method engaged was semi-structured, open-ended interviewing, which allowed participants to reveal comprehensive information while maintaining flexibility. In order to optimise the gathering of traditional knowledge, contacts with the rural community. An attempt was made to interact with the community in a way that promoted the sharing of *Garcinia indica* culinary and therapeutic applications.

## Results And Discussion

The distribution of product usage across different sites shows a clear variation in preferences for home use, local marketing and wholesale distribution. At Site 1, 53.34% of respondents (8 families) reported using the product for home use, 33.33% (5 families) for local marketing and 13.33% (2 families) for wholesaling. Site 2 demonstrated a slightly higher preference for local marketing, with 53.33% (8 families), while 46.67% (7 families) used the product at home, and none of the families utilized it for wholesaling mentioned in table 1 of figure 2.

Table 1 of figure 2 depict Site 3 exhibited a unanimous preference for home use, with 100% (15 families) of the participants using the product domestically and no interest in local marketing or wholesaling. Site 4 presented a more balanced distribution, with 26.66% (4 families) using the product for home use, 46.67% (7 families) for local marketing and 26.67% (4 families) for wholesale purposes.

At Site 5, the product was used by 53.33% (8 families) at home, 40.00% (6 families) in local marketing and 6.67% (1 family) for wholesaling. Site 6 showed a higher tendency for home use at 66.67% (10 families), with 33.33% (5 families) opting for local marketing and none for wholesale. Site 7 displayed a similar balance, with 40.00% (6 families) favouring home use, 46.67% (7 families) for local marketing and 13.33% (2 families) for wholesaling. At last Site 8 had 80.00% (12 families) preferring home use, 20.00% (3 families) for local marketing and none for wholesaling. In total, across all sites, 58.33% (70 families) of the product usage was for home use, 33.33% (40 families) for local marketing, and 8.33% (10 families) for wholesaling mentioned in table 1.

**Comment [A3]:** space

**Comment [A4]:** space

**Comment [A5]:** Should be part of the same sentence. Corrected: "... and Banavasi (S8) were chosen for the survey...".

**Comment [A6]:** Incomplete sentence. Needs to be rephrased for clarity. Corrected: "contacts with the rural community were established."

**Comment [A7]: Last sentence:** Incomplete or awkward structure. Suggested correction: "An attempt was made to interact with the community in a way that encouraged the sharing of culinary and therapeutic applications of *Garcinia indica*."

**Comment [A8]:** Missing space between "thefamilies" in "none of thefamilies."

**Comment [A9]: Inconsistent Formatting:** table 1 of figure 2" and "Table 1 of figure 2" should be corrected for clarity—either referring to "Table 1" or "Figure 2" separately.

A variety of customs were disclosed during these interviews, such as making kokum tambuli, sambar, juice and jam from the fruit pulp, as well as the use of fruit rind to make kokum huli and pickles. Some families reported novel use, such as using the crushed liquid as a natural pesticide in their backyard vegetable gardens, while kokum seed butter, though less popular, was occasionally utilised in cooking as kokum ghee.

The present study revealed a wealth of traditional knowledge regarding the culinary, medicinal, and marketing practices surrounding *Garcinia indica* in the Uttara Kannada district. It was found that different parts of the plant, such as the fruit pulp, rind, and seeds, were used in various applications. The culinary uses included making kokum tambuli, sambar, juice, jam, huli, and pickles, while kokum ghee, extracted from the seeds, was less commonly used (Figure 1). These findings align with the work of Rajeshwari and Manjunath (2015), who documented similar culinary practices.

Medicinally, *Garcinia indica* seed oil was reported as a traditional remedy for moisturizing dry skin, healing cracks, treating sunstroke, and managing ailments such as dehydration and amashanke. These uses were consistent with findings from Mohammad *et al.*, (2017), who documented the therapeutic benefits of kokum butter in treating skin ailments. Additionally, the fruit juice was recognized for its cooling properties, which echoes the observations of Murthy *et al.*, (2017). Despite its widespread traditional usage, the study found that the seeds, though valuable for butter extraction, were often discarded due to labour-intensive processing and limited market demand. This highlights the need for developing efficient seed decorticators to increase the utilization and value of *Garcinia indica* seeds, potentially boosting income for local residents (Bohra and Waman, 2019).

In terms of marketing, most families (58.33%) used the fruit for home consumption, while 33.33% sold it in local markets, and only 8.33% sold it to wholesalers. This suggests that while the fruit rind has a well-established market, the seeds and other byproducts remain underutilized. Developing value-added products and improving market access could provide economic benefits to rural communities, particularly by enhancing the use of the underutilized seeds for butter extraction, as recommended by Chate *et al.*, (2019).

### Grammatical Errors:

- "the interviewees" should be "the interviews."
- "In total, across all sites, 58.33% (70 families) of the product usage was..."—wording could be smoother. Suggest rewording: "In total, across all sites, 58.33% of the product usage was for home consumption by 70 families."
- "while kokum ghee, extracted from the seeds, was less commonly used (Figure 1)"—missing space before "(Figure 1)".

**Comment [A10]:** Information regarding traditional knowledge (culinary and medicinal practices) is repeated unnecessarily, creating redundancy. Consider consolidating.

**Comment [A11]: Clarification Needed:** The phrase "different parts of the plant, such as the fruit pulp, rind, and seeds" could benefit from clarification regarding specific uses of each part.

**Comment [A12]: Citation Consistency:** Some citations use a comma before the year, while others don't: "Mohammad *et al.*, (2017)" vs. "Chate *et al.* (2019)." Remove the comma before the year to ensure consistent citation formatting.

**Comment [A13]: Punctuation Errors:** Missing punctuation, like in "thefamilies utilized it for wholesaling mentioned in table 1 of figure 2."

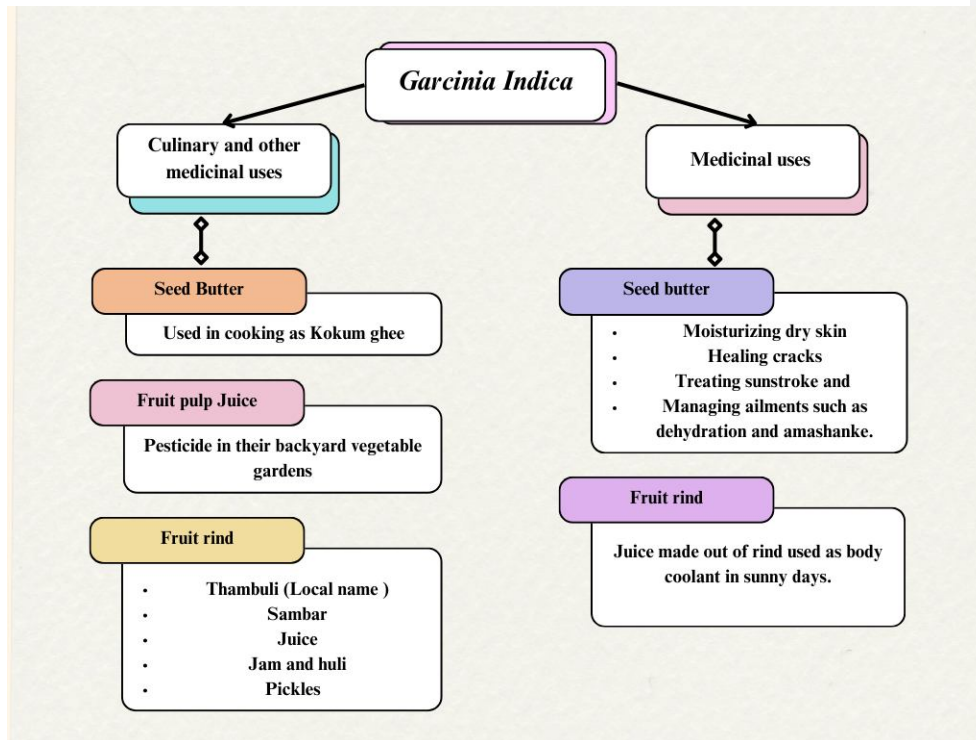


Figure 1. Ethnobotanical uses of *Garcinia Indica*

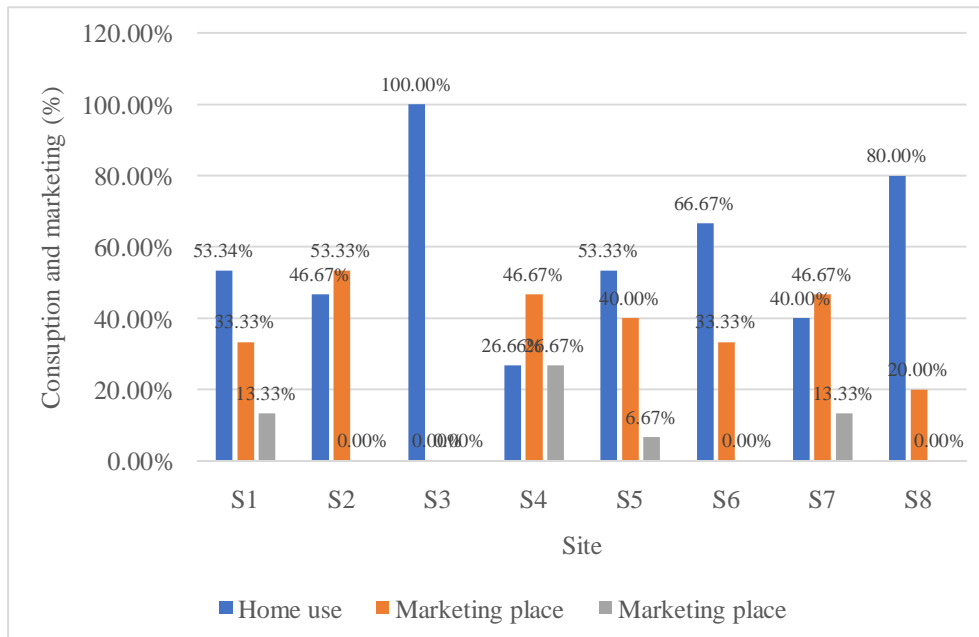
Table 1: Marketing place and home use from family

Site	Home use	Marketing place	
		Local	Wholesaler
S <sub>1</sub>	53.34 % (8)	33.33 % (5)	13.33 % (2)
S <sub>2</sub>	46.67 % (7)	53.33 % (8)	0.00 % (0)
S <sub>3</sub>	100.00 % (15)	0.00 % (0)	0.00 % (0)
S <sub>4</sub>	26.66 % (4)	46.67 % (7)	26.67 % (4)
S <sub>5</sub>	53.33 % (8)	40.00 % (6)	6.67 % (1)
S <sub>6</sub>	66.67 % (10)	33.33 % (5)	0.00 % (0)
S <sub>7</sub>	40.00 % (6)	46.67 % (7)	13.33 % (2)
S <sub>8</sub>	80.00 % (12)	20.00 % (3)	0.00 % (0)
<b>Total</b>	<b>58.33 % (70)</b>	<b>33.33 % (40)</b>	<b>8.33 % (10)</b>

Note- Brackate values are the number of family respondent

Comment [A14]: Table 1: Household Usage and Marketing Channels for *Garcinia indica* in Uttara Kannada District  
This title better reflects the content of the table, focusing on both home use and the different marketing channels involved (local and wholesaler).

Comment [A15]: Rephrase it as "Values the parentheses are



**Figure 2. Marketing and usage of *Garcinia indica***

## Conclusions

The study recorded both culinary and medicinal uses of *Garcinia indica*. The fruit rind was used in preparation of non-vegetarian curries (fish curries *etc.*) body coolant, insecticide and preparation of juice. Seed butter was also used as frying of edibles, moisturizer, treating cracks, rashes, burn wounds, sunstroke, dehydration and amashanke*etc.* The fruit contain HCA content which have high medicinal value as body coolant and reduction of stomach infection. Findings reflect the cultural and economic significance of the plant in local communities and emphasize the need to preserve and promote this traditional knowledge. The development of value-added goods and more effective technologies for seed processing, such as seed decorticators, may uncover new options for revenue production and sustainable usage of *Garcinia indica*. Rural families might profit monetarily from improved plant usage and marketing outlets, while also maintaining significant traditional practices for future generations.

## REFERENCE

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**Comment [A16]:** Put pie chart for better understanding

**Comment [A17]:** Per cent

**Comment [A18]:** • The sentence "Seed butter was also used as frying of edibles..." could be improved to "Seed butter was also used for frying food, as a moisturizer, and for treating cracks, rashes, burn wounds, and more."

**Comment [A19]:** The phrase "HCA content which have high medicinal value" should be changed to "HCA content, which has high medicinal value," to correct verb agreement and improve clarity.

**Comment [A20]:** "Reduction of stomach infection" could be rephrased for clarity, perhaps as "reducing stomach infections."

**Comment [A21]:** "Findings reflect the cultural and economic significance of the plant..." should be "The findings reflect..."

**Comment [A22]: Incomplete Thoughts:** The sentence "may uncover new options for revenue production and sustainable usage of *Garcinia indica*" could be reworded to "may uncover new opportunities for revenue generation and sustainable use of *Garcinia indica*."

**Comment [A23]: Run-on Sentence:** Sentence is too long. Consider breaking it into two sentences: "Rural families might profit monetarily from improved plant usage and marketing outlets. This could also help preserve significant traditional practices for future generations."

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